Engineered Comfort by Nailor Industries Inc.

IOM

Installation and Operation Manual

Fan Coil Controller – EZstat

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1 PREFACE

Your equipment is initially protected under the manufacturer's standard warranty. However, this warranty is provided under the condition that the steps outlined in this manual are followed for initial inspection, proper installation, periodic maintenance and everyday operation of the equipment.

This manual should be fully reviewed in advance of any actual work being done on the equipment. Should any questions arise, please contact your local Sales Representative or the factory before proceeding.

Consult the approved unit submittal, order acknowledgment, and other manuals for details on the applications and accessories provided with the equipment on each project.

Always follow proper procedures related to safety, handling, installation, operation, servicing of mechanical equipment as the manufacturer assumes no responsibility for personal injury or property damage resulting from improper or unsafe practices during handling, service or operation of any equipment.

2 SAFETY SYMBOLS & CONSIDERATIONS

The equipment covered by this manual is designed for safe and reliable operation within its design specification limits. To avoid personal injury or damage to equipment or property while installing or operating this equipment, it is essential that qualified, experienced personnel perform these functions using good judgment and safe practices. To promote safety, the following symbols are used in this document to alert the reader to potential hazards:

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution. Usually an instruction will be given, together with a brief explanation.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

NOTE is used to highlight additional information which may be helpful to you.

TIP indicates time saving shortcuts and programming tips.

3 INTRODUCTION

The EZstat combines the power of a space-mounted equipment controller with the convenience of built-in temperature sensors. The EZstat controller includes a wide range of factory supplied programs for two and four pipe fan coil units.

3.1 Features

- No special programming, software application, or setup tools are required to configure and commission an EZstat
- Bright, full-color display is easy to read across a room even in bright sunlight
- Display - Large numbers and simple color icons to indicate heating or cooling, local setback modes, and fan operation
- Five function keys, operator can change set-points and fan, heating, cooling modes, choose between Fahrenheit or Celsius values, Set BACnet addressing, Set up and commission the installation, and add or change user passwords
- Ready to connect to a BACnet MS/TP network. Device instance, MAC address, and baud rate are set from the password protected front controls; feature a hardware clock and BACnet schedule that can be set up from the front panel or as standard BACnet objects and properties
- White finish

3.2 User Functions

EZstat user functions are limited to changing the following functions:

- Active temperature set-points
- Fan operation
- Changing between heating and cooling
- Override scheduled occupancy or occupancy based on the schedule in the EZstat
- Change the display between Fahrenheit and Celsius

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3.3 Specifications

EZstat specifications are subject to change without notice.

User Interface

The user interface is a color display and with five push buttons. Through the menu driven display, an operator can do the following:

- Add or change user passwords
- Change setpoints
- Set BACnet addressing
- Set up and commission the installation
- Configure any available options

Security

Separate passwords for users and controls technicians.

Display type

- 128 ×128 pixels
- Active color LCD with LED back lighting
- 0.98 x 1.04 inches (25 x 26 mm)

Inputs and outputs

All inputs and outputs are preprogrammed and application specific. Review wiring label for proper connections.

Analog inputs

Analog inputs represent BACnet analog input objects and are configured for discharge air temperature, remote temperature sensor and water temperature sensor. Not all input sensors are applicable or required for all applications.

- Sensors are automatically detected
- Inputs accept industry-standard 10,000 Ω, Type II (Nailor Part# H1-1989) or Type III (Nailor Part# H1-0246 and H1-1764B) thermistors sensors.
- Input overvoltage protection up to 24 VAC, continuous. 12-bit analog-to-digital conversion

Analog outputs

Analog outputs are configured to represent BACnet analog objects. The outputs control modulating valves, and variable speed fans, or other equipment that requires a proportional input signal.

- Short-circuit protected
- Loads up to 10 mA at 0–12 VDC
- 8-bit PWM digital-to-analog conversion

Relay outputs

Relay outputs are configured to represent BACnet binary objects. The outputs control On/Off valves, speeds for three-speed fans, fan start circuits, or electric heat.

- All relay outputs are normally open, SPST, Form “A” relays
- 1 ampere maximum per relay at 24 VAC or VDC for each output. Maximum for all relay outputs is 3 amperes (72VA).

Connectors

- Screw terminal block mounted to back plate
- Wire size 14-22 AWG

Communications—BACnet MS/TP

- Integral peer-to-peer BACnet MS/TP network communications. Network speeds from 9600 to 76,800 baud.
- Front panel configurable device instance, MAC address, and baud. Automatic baud detection, see the topic Set up the communication. Screw terminal block mounted to back-plate. Wire size 14–22 AWG
- Meets or exceeds ANSI/ASHRAE BACnet Standard 135-2008 for Application Specific Controllers

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Accuracy

Type	±0.36° F (±0.2° C)
Accuracy	±0.36° F (±0.2° C)
Resistance	10,000 Ω at 77° F (25° C)
Operating Range	48 to 96° F (8.8 to 35.5° C)

Regulatory

- UL 916 Energy Management Equipment
- FCC Class A, Part 15, Subpart B and complies with Canadian ICES-003 Class B
- BACnet Testing Laboratory listed as an application specific controller (listing applied for)
- SASO PCP Registration KSA R-103263

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

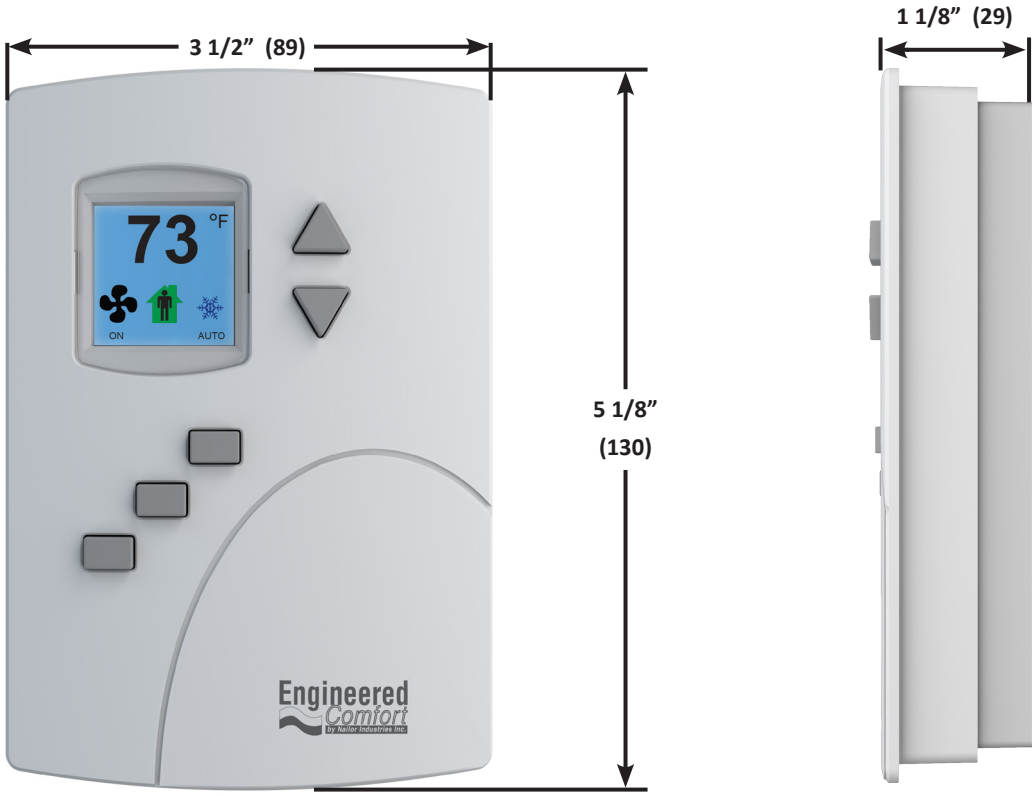
Environmental limits

Operating	32 to 120° F (0 to 49° C)
Shipping	–40 to 140° F (–40 to 60° C)
Humidity	0–95% relative humidity (non-condensing

Installation

Supply Voltage	24 VAC (–15%, +20%), 50-60 Hz, 12 VA, Class 2 only, non-supervised. All circuits, including supply voltage, are power limited circuits.
Weight	Approximately 6 ounces (170 grams)
Case Material	Flame retardant plastic

Dimensions



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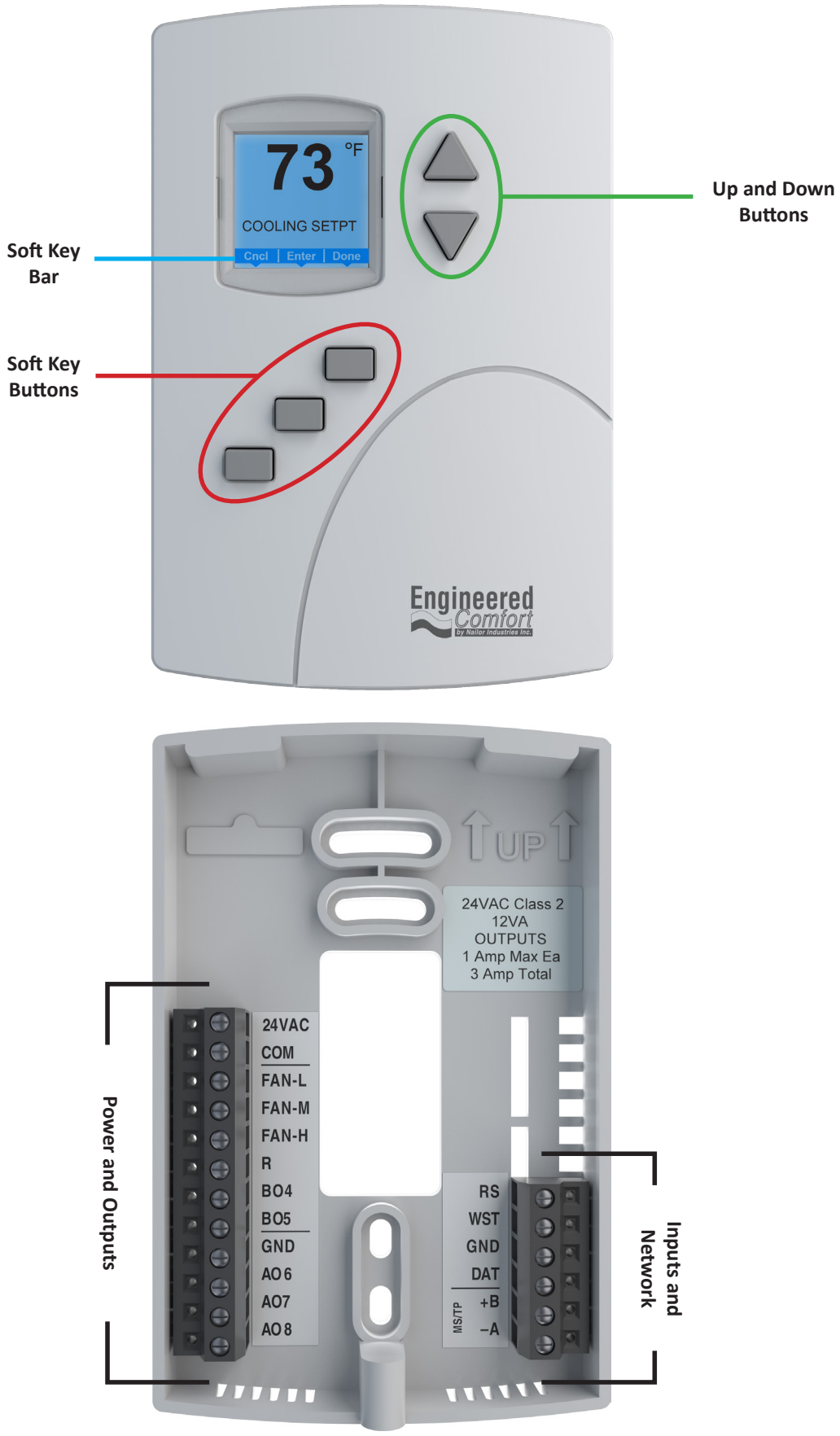
3.4 EZstat Features



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4 INSTALLATION

This section provides important instructions and guidelines for installing the EZstat. Carefully review this information before installing the controllers.

Installing the sensors includes the following topics that are covered in this section:

- Mounting the EZstat
- Connecting inputs
- Connecting outputs
- Connecting power
- Maintenance

4.1 Mounting the EZstat

For the most accurate performance, install the EZstat on an inside wall where it can sense the average room temperature. Avoid locations with direct sunlight, heat sources, windows, air vents, and air circulation or obstructions such as curtains, furniture, etc.

The EZstat must not be:

- Mounted on an exterior wall.
- Mounted on or near an object with a large thermal mass such as a concrete block wall.
- Blocked from normal air circulation by obstructions.
- Exposed to heat sources such as lights, computers, copiers, or coffee makers, or to direct sunlight at any time of the day.
- Exposed to drafts from windows, diffusers, or returns.
- Exposed to air flow through connecting conduits or empty spaces behind walls.

Rough-in preparation

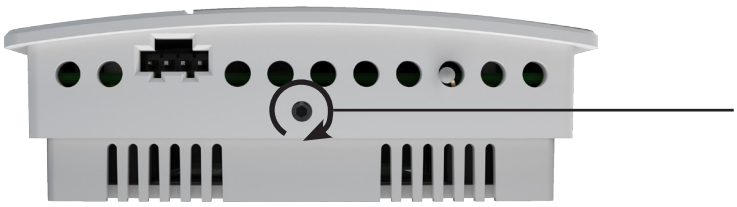
Complete rough-in wiring at each location before mounting an EZstat. This includes the following steps

- Install the supplied mounting base directly to a wall, a vertical electrical box, or a box with a wall plate kit.
- Routing the connecting cable or cables from the EZstat to the equipment it is controlling.
- If required, install an appropriate wall plate kit.
- Block leaks and airflow from conduits with plumber's putty or similar material.
- If replacing an existing thermostat, label existing wires for reference when removing the existing thermostat.

Installing the EZstat

To install the controller on a mounting base, do the following:

1. Turn the Allen screw in the base of the sensor clockwise until it clears the case.



2. Swing the EZstat away from the mounting base to remove it.
3. Route wiring for the EZstat through the mounting base.
4. Position the base with the embossed UP toward the ceiling and fasten it directly to a vertical 2 x 4 inch electrical box.
5. Connect the wires for the EZstat to the terminals in the mounting base.
6. Place the top of the sensor over the top of the mounting base and swing it down over the Allen screw bracket. Be careful not to pinch any wiring.

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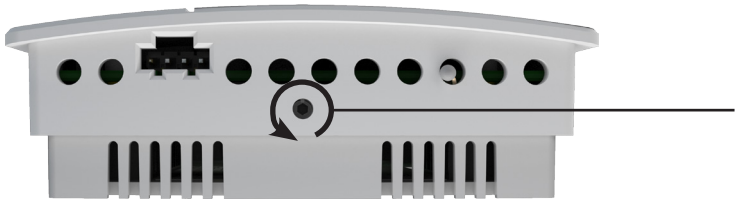
7. Turn the Allen screw counterclockwise until it backs out of the mounting base and engages the case.



Turn Counterclockwise until the screw engages the base.

CAUTION

To prevent mounting screw heads from toughing the circuit board in the controller, use only the mounting screws supplied. Using screws other than the type supplied may damage the EZstat unit.

4.2 Connecting Inputs

The inputs for the EZstat are configured for specific functions and do not require set up in the field. Not all inputs are required for every model or application.

Remote space temperature sensor (optional)

Connect a 10kΩ, Type II thermistor temperature sensor (Nailor part #H1-1989) to the remote space temperature (RS) input and ground (GND) terminals. The input includes the internal pull-up resistor. Follow the instructions supplied with the sensor for installation.

When a remote space temperature input is connected to the EZstat, the remote temperature is used instead of the internal temperature sensor.

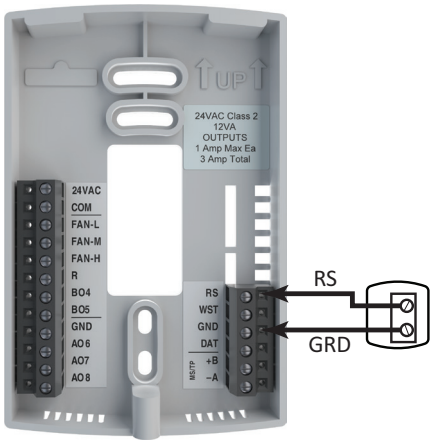


Fig. 4-1 Wiring for remote space temperature sensor

Discharge air temperature

Connect a 10kΩ, Type III thermistor temperature (Nailor part #H1-0246) probe to the discharge air temperature (DAT) input. The input includes the internal pull-up resistor.

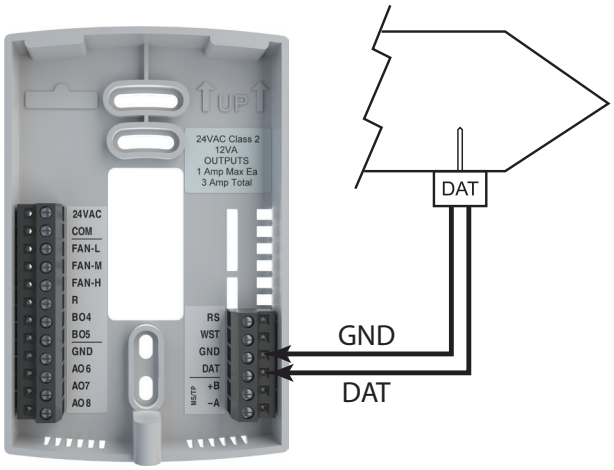


Fig. 4-2 Wiring for Discharge Air Temperature Sensor

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Water temperature sensor

Connect a 10kΩ, Type III thermistor temperature probe (Nailor part #H1-1764B) to the water temperature (WST) input. The input includes the internal pull-up resistor. Follow the instructions supplied with the sensor for installation.

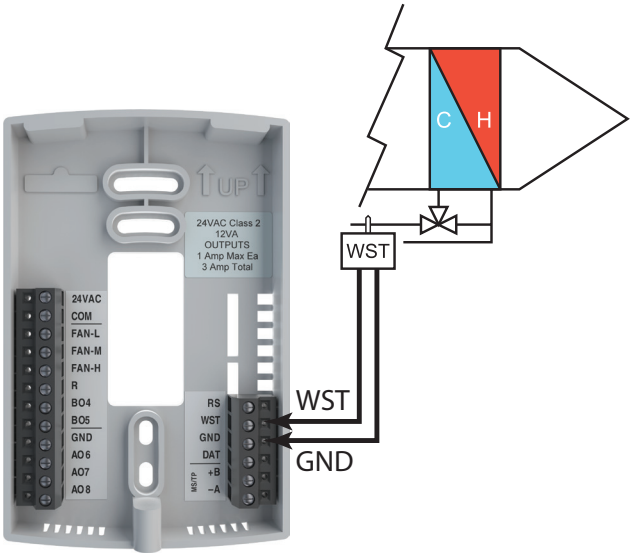

Fig. 4-3 Wiring for a water temperature sensor

4.3 Connecting Outputs

The EZstat outputs are configured for specific applications.

- Depending on the configuration, the EZstat outputs are designed for either 24 VAC or 0-10 VDC loads.
- The outputs may represent analog or digital signals.

Improperly connecting loads or equipment to output terminals may damage the equipment. Connect only as shown in the following diagrams or application drawings.

Connecting to a three-speed fan

The following diagram shows the connections for a three-speed fan. The fan circuits must be a 24 VAC pilot duty only.

- For a single-speed fan, use only the FAN-L connection.
- For a three-speed, use FAN-L, FAN-M, and FAN-H

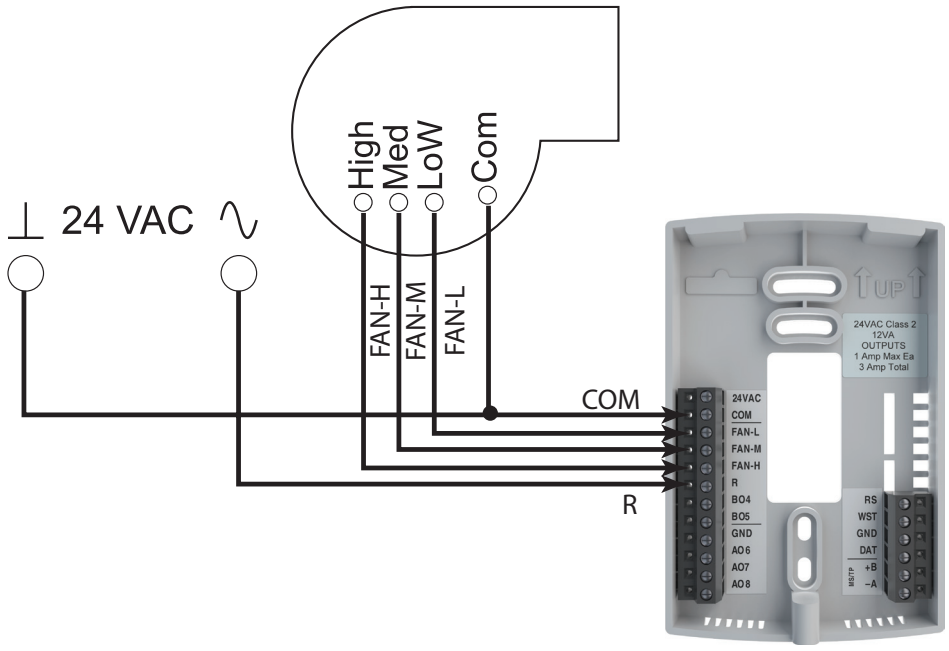

Fig. 4-4 Connections to a three-speed fan

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Connecting to a modulating fan

The following diagram shows the connections for a modulating speed fan.

- The fan start circuit must be a 24 VAC circuit. Connect it to the FAN- L output.
- The speed control is a 0-10 VDC analog output.

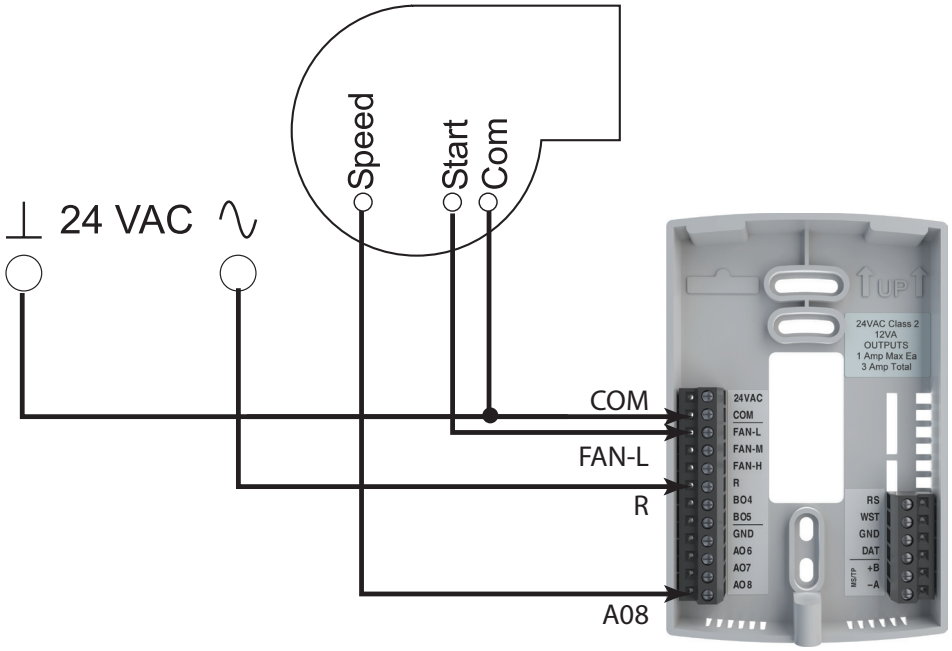

Fig. 4-5 Connections for a modulating fan

Connecting to modulating valves

The following diagram shows the connections for a modulating mixing valves. The valve control signal is a 0-10 V analog output.

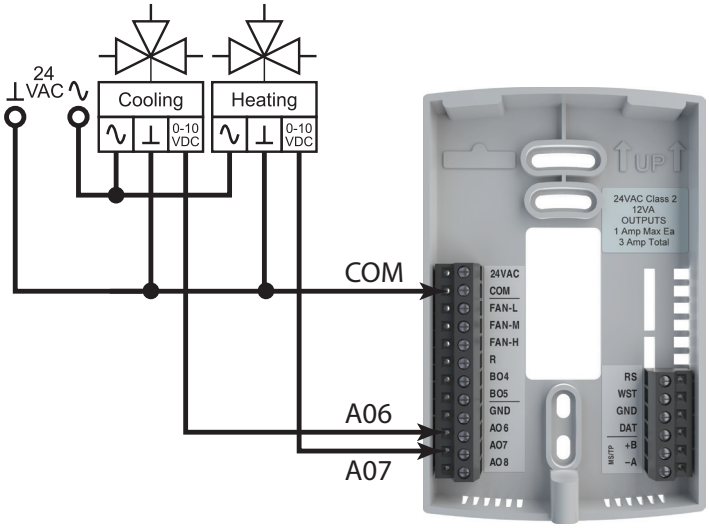

Fig. 4-6 Connections to modulating heating & cooling valves

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Connecting to On/Off valves

The following diagram shows the connections for an on/off valve.

- The valves are actuated by 24 VAC
- The outputs are 24 V relays.

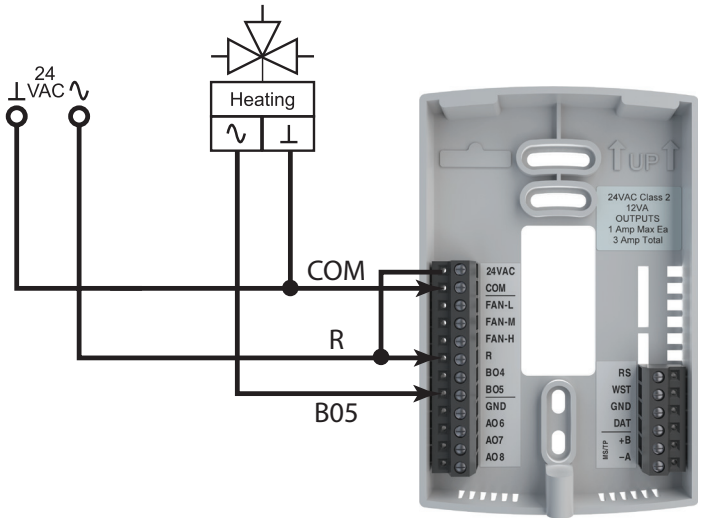

Fig. 4-7 Connecting on/off valve

4.4 Connecting Power

The EZstat requires an external, 24 VAC power source. Use the following guidelines when choosing and wiring transformers.

- Use only a Class-2 transformer of the appropriate size to supply power.
- Connect the transformer's neutral lead to the COM terminal.
- Connect the AC phase lead to the 24VAC terminal.
- Power is applied to the controller when the transformer is powered.

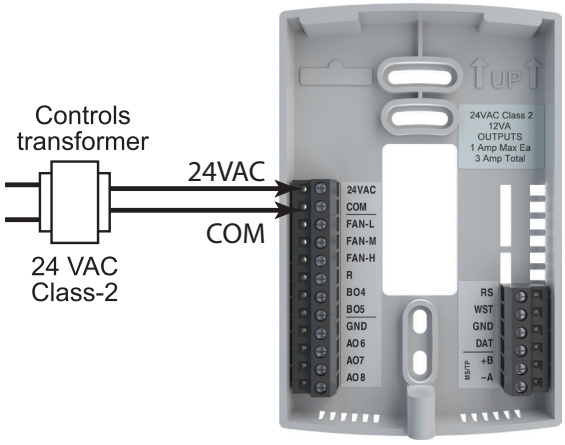

Fig. 4-8 Wiring for EZstat power

4.5 Maintenance

Remove dust as necessary from the holes in the top and bottom. Clean the display with soft, damp cloth and mild soap.

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5 USER FUNCTIONS

This section covers topics for the end user in a facility.

EZstat user functions are limited to changing the following functions:

- Active temperature setpoints
- Fan operation
- Changing between heating and cooling
- Override scheduled occupancy or occupancy based on the schedule in the EZstat.
- Change the display between Fahrenheit and Celsius

5.1 Operating the EZstat

EZstat functions are accessible through a user interface consisting of simple, context sensitive menus. The menus are opened and options are selected by using the buttons and a color display on the front of the EZstat. *See Section 3.4 for EZstat features.*

- Pressing either the ▼ or ▼ button changes a selection, setting, or value.
- Pressing the Enter button saves the selected setting or value. Typically the Enter button is the middle of the three buttons below the display.
- Saving a selection also advances to the next display.

The three buttons below the display are defined by labels in the soft key bar. Typically the buttons are designated for the following functions:

Back	Returns to the previous menu.
Cncl	Cancels current changes.
Done	Push this button at any point while entering a value. For example, if you have entered the first two digits of a password and the remaining two digits are correct, pushing Done completes the entry of the password.
Enter	Pushing this button enters the selection and advances to the next step.
Exit	Returns to temperature display

The operating modes of the EZstat are represented by the display icons.

Table 5–1 Operating mode icons

Icon	Description	Mode
	The fan icon rotates when the system fan is operational. In systems with multispeed fans the icon rotation is the same regardless of speed. When fan operation is set to automatic, the word “ON” is placed under the fan icon.	Fan
	Occupied—Occupancy is set to occupied by the schedule maintained in the controller.	Occupancy
	Unoccupied—Occupancy is set to unoccupied by the schedule maintained in the controller.	Occupancy
	Standby—The space is temporarily unoccupied because of lack of detected motion in the room.	Occupancy
	Override—A user has entered temperature setpoints that override the unoccupied setpoints.	Occupancy
	Cooling—The system will cool the space until the cooling setpoint is reach. The icon is in motion when cooling is taking place.	Heating/Cooling
	Heating—The system will heat the space until the heating setpoint is reached. The icon is in motion when heating is taking place.	Heating/Cooling
Off	System is off	Heating/Cooling

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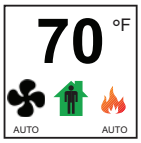
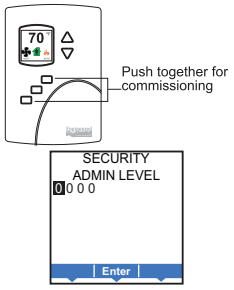
5.2 Entering User or Admin Password (Password 1 & 2, respectively)

User functions may require a password consisting of four numbers. Once either the User or Admin level password is entered, the functions will remain unlocked for 60-seconds after the last button is pushed.

To set up the password levels, go to *Create and/or change Passwords*.

NOTE **Security User Level – Calls up Password 1 in the program**
Security Admin Level – Calls up Password 2 in the program.

TIP **Allow 60 seconds time elapse for password change/setup to enable.**

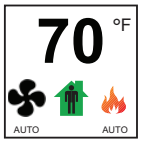
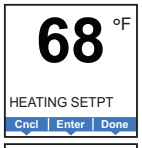
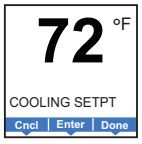
Procedure	Steps	Display
Starting Display	Start at the temperature display.	
Enter the User Password	1. Press either the ▲ or ▼ button for the first digit of Password 1. 2. Press the Enter button to select the next digit. Repeat for all remaining digits. The Enter button is the middle of the three buttons below the display. If the password is correct, the display will advance to the first menu.	
Enter the Admin Password	1. Press the left and right buttons below the display at the same time and hold them until the display changes to the SECURITY ADMIN LEVEL Display NOTE **If Password 2 has not previously been entered, the display will change to the MAIN menu.** 2. Press either the ▲ or ▼ button for the first digit of Password 2. 3. Press the Enter button to select the next digit. Repeat for all remaining digits.	

5.3 Changing the active setpoints

To enter or change the active temperature setpoints you may need to enter the User password.

NOTE **In the following procedure the current active setpoint–either cooling or heating–is the first setpoint to change. Once that setpoint is entered, the display advances to the next setpoint.**

To change the operation of the fan, occupancy, or heating/cooling, see the topic *Setting the operating modes.*

Procedure	Steps	Display
Starting Display	Start at the temperature display.	
Enter the Password	1. Press either the or button to change the active temperature setpoint. 2. Press the button to save the value. The display will advance to the next setpoint. 3. Press either the ▲ or ▼ button to change the setpoint. 4. Press the Enter button to save the value. The display will return to the temperature display	 

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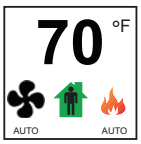
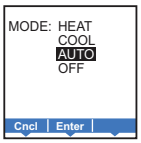
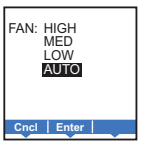
5.4 Setting the operating modes

The operating modes set the following functions:

- Fan operation
- Changing between heating and cooling
- Override scheduled occupancy or occupancy that has been set by a schedule.
- Change the display units from Fahrenheit to Celsius.

Procedure	Steps	Display
Starting Display	Start at the temperature display.	
Change the heating or cooling mode.	1. Push the button under the heating/cooling icon. 2. Press either the ▲ or ▼ button to select the heating/cooling mode. The mode may be one of the following. • Heat—The system will only heat the space. • Cool—The system will only cool the space. • Auto—The system will switch between heating and cooling. • Off—The system is turned off. 3. Press the Enter button to save the setting. The display returns to the temperature display.	 Heating/Cooling Icons
Set the fan mode.	1. Press the Enter button to select the next digit. Repeat for all four digits. 2. Press either the ▲ or ▼ button to select the fan mode from the following options. • Auto (Default) — Auto function is utilized to match EPIC (ECM) motor with this feature for optimum energy savings. AUTO FAN RESET for ECM applications only, by enabling the AUTO FAN RESET located in SYSTEM menu. To adjust default time of 60 mins, select LOCAL OVRD TIME. The AUTO FAN RESET and LOCAL OVRD TIME work together. The AUTO FAN RESET function protects from user accidentally changing out of FAN - AUTO mode on interface. After time expires, the control will reset back to Auto Mode, while ensuring the efficiency benefits of the variable speed motor. The word ON will be placed under the fan icon. • Low, Med, High—Sets the speed at which 3-speed or modulating fans will run continuously. 3. Press the Enter button to save the setting. The display returns to the temperature display.	 Fan Icon  Multi-speed fan option

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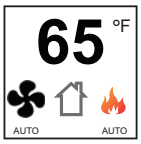
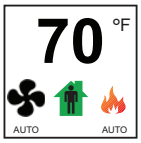
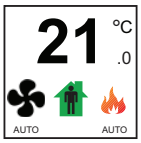
Procedure	Steps	Display
Change the override setpoint	Entering an override setpoint can only take place if the EZstat is in the unoccupied mode. 1. Push the button under the unoccupied icon . 2. Press either the ▲ or ▼ button to change the first digit of the password. 3. Press the Enter button to select the next digit. Repeat for all four digits. 4. Press either the ▲ or ▼ button to turn the override on or off. • Override Off—The controller uses the unoccupied setpoint as the active setpoint. • Override On—the controller changes to the occupied setpoint which can then be temporarily changed. 5. Press the Enter button to save the setting. NOTE ***When the system is in the unoccupied mode, changing the active setpoint will automatically place the system in the override mode.***	
Change the display units	To temporarily change the display units to either Celsius or Fahrenheit, press and hold the middle button under the display until the units change.	 

6 COMMISSIONING FUNCTIONS

The topics in this section are advanced topics for control technicians and engineers. These topics cover procedures for the initial EZstat setup.

The EZstat commissioning functions are values and settings that are entered during the installation and commissioning of a controller and the equipment it is controlling. Typically these functions do not change after the installation and commissioning process.

To set up the commissioning functions, you will need the following information:

- Information about the equipment
- The sequence of operation for the equipment
- The building automation system plans for controllers that are part of a network.

Users may change the occupied heating and cooling setpoints without accessing the commissioning functions. This procedure is covered in the topic *User functions*.

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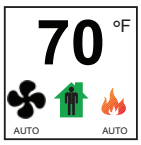
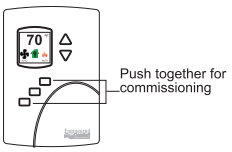
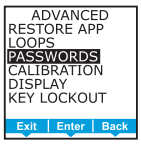
6.1 Create and/or Change Passwords

For access to the commissioning functions you will need to know the Admin Level Password, also known as Password 2.

If the controller has not been previously set up, no password is required and the user can either continue on to setup the User & Admin Level passwords (see table below) or proceed directly to the section of interest.

Password Functions:

- **User Level** – Calls up Password 1 in the program. This is for a facility user and limits changes to active setpoints, fan operation, occupancy, and heating and cooling modes.
- **Admin Level** – Calls up Password 2 in the program. This is generally used by a controls technician to set up and commission the EZstat. When set, will lock user out from setpoints, fan operation, occupancy, and heating and cooling modes.

Procedure	Steps	Display
Starting Display	Start at the temperature display.	
Creating Password 1	1. Press the left and right buttons below the display at the same time and hold them until the display changes to the SECURITY ADMIN LEVEL display 2. If Password 2 has not previously been entered, the display will change to the MAIN menu. Otherwise, enter the password. 3. Under the MAIN menu, select ADVANCED followed by PASSWORDS. 4. Select the password you wish to configure and proceed to the next screen. 5. Press either the ▲ or ▼ button to program the first digit of Password 1 and/or Password 2. 6. Press the Enter button to select the next digit. 7. Repeat steps 5 & 6 for all remaining digits.	 

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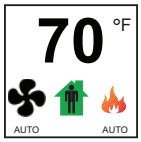
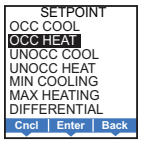
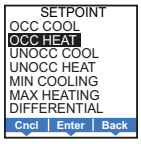
Procedure	Steps	Display
Select a commissioning function	Access to the commissioning functions always starts at the MAIN menu display.	

6.2 Setting the commissioning setpoints

The commissioning setpoints set the operational setpoints and limits for the EZstat. Setting commissioning setpoints requires entering Password 2 which is described in the topic *Enter the Commissioning mode*.

NOTE ***Not all setpoints in the following procedure are applicable to all models of EZstat.***

Procedure	Steps	Display
Starting Display	1. Start at the temperature display. 2. Enter Password 2. The display changes to the MAIN menu display.	
Choose and set the setpoints	1. From the MAIN menu, press either the ▲ or ▼ button to select SETPOINTS. 2. Press the Enter. The SETPOINTS menu opens. 3. Choose and set each of the following setpoints. • OCC COOL—The cooling setpoint that is used as the active setpoint when the system is occupied. • OCC HEAT—The heating setpoint that is used as the active setpoint when the system is occupied. • UNOCC COOL—The cooling setpoint that is used as the active setpoint when the system is un-occupied. • UNOCC HEAT—The heating setpoint that is used as the active setpoint when the system is unoccupied. • MIN COOLING—The minimum cooling setpoint that a user can select as the active setpoint. • MAX HEATING—The maximum heating setpoint that a user can select as the active setpoint. • DIFFERENTIAL—The minimum value between the cooling or heating setpoints. The EZstat will always maintain this difference between set points. • STBY OFFSET—A value used to calculate the standby setpoint. The standby setpoint is calculated by adding or subtracting the offset value to or from the value of the occupied setpoint. (Applicable to BACnet systems only). • COOL DAT LIMIT* – A value used to control the discharge cooling temperature. • HEAT DAT LIMIT* – A value used to control the discharge heating temperature. NOTE **** Nailor Exclusive: The DAT is monitored by the control and will modulate the valve according to the demand versus DAT setpoint***	  

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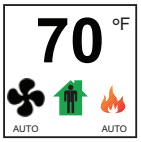
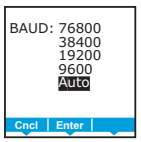
6.3 Set up the communications

Setting BACnet communications properties is required only if the EZstat is integrated into a network with other BACnet controllers. Entering the communications properties requires entering Password 2.

See the topic *Connecting to MS/TP network* for network wiring details.

Procedure	Steps	Display
Starting Display	1. Start at the temperature display.	
	2. Enter Password 2. The display changes to the MAIN menu display.	
Change the network communication properties.	1. From the MAIN menu, press either the or button to select COMM.	
	2. Press Enter. The COMM menu opens.	
	3. Choose and set the following properties: • DEVICE ID—This is the BACnet device instance. The device instance must be within the range of 1 to 4,194,302.	
	• MAC—The MAC address must be in the range of 1-127.	
	• BAUD—Set to match other devices on the BACnet MS/TP network. The choices are Auto, 9600, 19,200, 38,400, or 76,800.	
	NOTE ***Note: After changing a communication property, the EZstat will reset.***	

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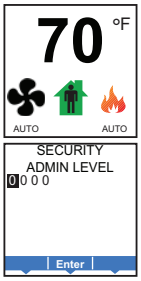
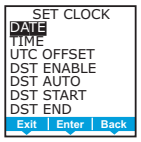
6.4 Set the time and date

Setting the time and date requires entering Password 2.

NOTE

If the EZstat is connected to a BACnet network that includes a time service master, the time and date are automatically set to the network time and date.

Set the time and date

Procedure	Steps	Display
Starting Display	1. Start at the temperature display. 2. Enter Password 2. The display changes to the MAIN menu display.	
Select the SCHEDULE menu.	1. From the MAIN menu, press either the ▲ or ▼ button to select SCHEDULE. 2. Press Enter. The SCHEDULE menu opens. 3. Choose SET CLOCK and then press Enter. The SET Clock menu opens.	
Choose a clock function to set.	Choose one of the features in the SET CLOCK menu to change the date, time, or Daylight Saving Time (DST) setting. • DATE—The current calendar date. • TIME—Time is set according to a 12-hour clock. • UTC OFFSET—Enter the time offset, in minutes, between local standard time and Universal Time Coordinated. The value of the property ranges from -780 to +780 seconds. The time zones to the west of the zero degree meridian are positive values; those to the east are negative values. The value of the UTC Offset property is subtracted from the UTC received in a UTC Time Synchronization service request to calculate the correct local standard time. • DST ENABLE—Set to TRUE to enable Daylight • Saving Time and FALSE to use standard time year around. • DST AUTO—When set to TRUE, the EZstat automatically calculates the start and end dates from relative dates. For example, set DST START to the first Sunday in March instead of a calendar date. • DST START and DST END—Enter the dates and time to begin observing DST. If DST AUTO is set to TRUE the dates are relative; if set to FALSE the date is a calendar date.	

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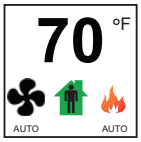
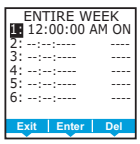
6.5 Setting the occupancy schedule

The schedule in the EZstat controls the occupancy mode. If the schedule is set to ON, the EZstat uses the occupied setpoint as the active setpoint. If the schedule is OFF, the unoccupied setpoint is used.

NOTE

The schedule in the EZstat is a BACnet schedule object. If the EZstat is connected to a BACnet network the schedule can be set up with a BACnet operator workstation.

Setting the occupancy schedule requires entering Password 2.

Procedure	Steps	Display
Starting Display	1. Start at the temperature display. 2. Enter Password 2. The display changes to the MAIN menu display.	
Select the SCHEDULE menu.	1. From the MAIN menu, press either the ▲ or ▼ button to select SCHEDULE. 2. Press Enter. The SCHEDULE menu opens.	
Choose and set a weekly schedule.	1. From the SCHEDULE menu, choose one of the following schedule entry methods to enter a weekly schedule. • ENTIRE WEEK—Sets the schedule for all seven days of the week at one time. • WEEKDAYS—Sets the schedule for Monday to Friday. Saturday and Sunday are not changed • WEEKEND—Sets the schedule for Saturday and Sunday. Monday to Friday remain unchanged. • INDIVIDUAL DAYS—Sets the schedule for just the selected day of the week. 2. Change the daily times and values in the schedule to set the occupancy mode to either ON or OFF. • When finished with each pair push Enter or Done. • When finished with the schedule push Exit to return to the SCHEDULE menu	 

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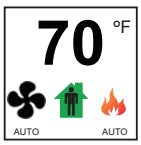
Procedure	Steps	Display
Choose and set a holiday schedule	1. Use a holiday schedule to override the values in the weekly schedule. Months and years can be entered as follows: • To choose ANY as the year, select the year and push the ▼ arrow past the current year • For month the choices are any of the twelve months of the year, ANY, EVEN, and ODD. 2. From the SCHEDULE menu, choose HOLIDAYS. 3. From the HOLIDAYS list, choose a holiday to edit. 4. From the menu for the holiday, choose • DATE—Enter a single date on which the holiday schedule will override the values of the weekly schedule. • DATE RANGE—Enter a range of dates on which the values and times listed in the holiday schedule will override the values of the weekly schedule. • WEEK N DAY—A day of the week and month on which the values and times listed in the holiday schedule will override the values of the weekly schedule.	

6.6 Enter the commissioning mode

For access to the commissioning functions you will need to know Password 2.

- If the controller has not been previously set up, no password is required.
- A new Password 2 can be entered in the advanced commissioning functions. See the topic *Advanced Options*.

Procedure	Steps	Display
Starting Display	1. Start at the temperature display. 2. Enter Password 2. The display changes to the MAIN menu display.	
Choose and set the fan coil system options	1. From the MAIN menu, press either the ▲ or ▼ button to select SYSTEM. 2. Press Enter. The SYSTEM menu opens.	

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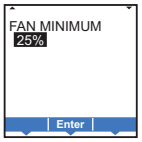
<table>
<tr><th>Procedure</th><th>Steps</th><th>Display</th></tr>
<tr><td>Choose and set the fan coil system options</td><td>3.Press the ▼ to choose any of the following items:
<table>
<tr><th>Common Options</th><th>Two Pipe Only</th></tr>
<tr><td>• LOCAL OVRD TIME
• FAN OFF DELAY
• OCCUPIED FAN
• FAN SPEEDS (three speed fans only)
• FAN COOL MAX
• FAN MINIMUM (modulating fans only)
• FAN HEAT MAX
• MOD FAN ACTION
• MAX VLV LOW
• MAX VLV MED
• MAX VLV HIGH
• DAT ENABLE</td><td>• AUTO FAN RESET
• STAGE 1 FAN
• STAGE 2 FAN
• VLV ACTION

Four Pipe Only

• CL VLV ACTION
• HT VLV ACTION</td></tr>
</table></td><td>
</td></tr>
<tr><td>Set the local override time.</td><td>Set the local override time. From the SYSTEM menu choose LOCAL OVRD TIME to set the time the EZstat will hold an override temperature setpoint as the active setpoint. At the end of the period, the EZstat will use either an occupied or unoccupied setpoint as the active setpoint.</td><td>
</td></tr>
<tr><td>Set the fan delay.</td><td>From the SYSTEM menu choose FAN DELAY OFF to set the time the system fan will continue to run after the last heating or cooling stage is turned off.</td><td>
</td></tr>
<tr><td>Set the occupied fan control.</td><td>From the SYSTEM menu choose OCCUPIED FAN to choose the following:
• When ON, the fan will run continuously when the schedule is occupied (On).
• When the schedule is unoccupied (Off) the fan will run only when there is a call for heating or cooling.</td><td>
</td></tr>
<tr><td>Set fan speeds for three-speed fans.</td><td>Select FAN SPEEDS from the SYSTEM menu to designate the number of speeds at which the installed fan will run.</td><td>
</td></tr>
<tr><td>Set fan speeds for modulating speed fans</td><td>Select FAN MINIMUM and FAN MAXIMUM from the SYSTEM menu to set fan speed for modulation fans.
• FAN MINIMUM—Sets the slowest speed at which the fan will run when a user sets the fan speed to LOW.
• FAN HEAT MAXIMUM—Sets the fastest speed at which the fan will run when a user sets the fan speed to HIGH for heating.
• FAN COOL MAXIMUM – Sets the fastest speed at which the fan will run when a user sets the fan speed too HIGH for cooling.

NOTE The Min. and Max. CFMs are also the range at which the ECM operates throughout the sequence when set to auto.</td><td> 

</td></tr>
</table>

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Procedure	Steps	Display
Set fan speeds for modulating speed fans	**How to Setup Fan CFM example:** Refer to the 35FH ECM Motor Fan Calibration Table. The VDC value correlates to the CFM on the calibration chart. Fan percentages are entered into the EZstat and convert output to VDC. For an example: 10% = ~1.0VDC 50% = ~5.0VDC 100% = ~10.0VDC	

ECM MOTOR FAN CALIBRATION TABLE
CFM vs VDC (Imperial Units)
HIGH PERFORMANCE HORIZONTAL FAN COIL UNIT
MODEL SERIES: 35FH • UNIT SIZE 8 • 120/208/230/277 VAC

CFM	0-10 VDC REF.	CFM	0-10 VDC REF.	CFM	0-10 VDC REF.	CFM	0-10 VDC REF.
0	0.00	412	2.84	595	5.25	770	7.66
190	0.50	418	2.91	600	5.32	775	7.73
199	0.57	423	2.98	605	5.39	780	7.80
207	0.64	429	3.05	610	5.46	785	7.87
216	0.71	434	3.12	616	5.53	790	7.94
224	0.78	440	3.19	621	5.60	795	8.01
232	0.85	445	3.26	626	5.68	800	8.09
240	0.93	451	3.34	632	5.75	805	8.16
248	1.00	456	3.41	637	5.82	810	8.23
255	1.07	462	3.48	642	5.89	815	8.30
263	1.14	467	3.55	647	5.96	819	8.37
270	1.21	472	3.62	653	6.03	824	8.44
277	1.28	478	3.69	658	6.10	829	8.51
284	1.35	483	3.76	663	6.17	834	8.58
291	1.42	488	3.83	668	6.24	839	8.65
298	1.49	494	3.90	673	6.31	844	8.72
304	1.56	499	3.97	679	6.38	849	8.79
311	1.63	504	4.04	684	6.46	854	8.87
318	1.71	510	4.12	689	6.53	859	8.94
324	1.78	515	4.19	694	6.60	864	9.01
330	1.85	520	4.26	699	6.67	868	9.08
337	1.92	526	4.33	705	6.74	873	9.15
343	1.99	531	4.40	710	6.81	878	9.22
349	2.06	536	4.47	715	6.88	883	9.29
355	2.13	542	4.54	720	6.95	888	9.36
361	2.20	547	4.61	725	7.02	893	9.43
367	2.27	552	4.68	730	7.09	899	9.50
373	2.34	557	4.75	735	7.16	904	9.57
378	2.41	563	4.82	740	7.24	909	9.65
384	2.49	568	4.90	745	7.31	914	9.72
390	2.56	573	4.97	750	7.38	919	9.79
396	2.63	579	5.04	755	7.45	925	9.86
401	2.70	584	5.11	760	7.52	930	9.93
407	2.77	589	5.18	765	7.59	935	10

THIS UNIT HAS BEEN FACTORY SET AT_____CFM.
RE-CALIBRATION IS NOT REQUIRED UNLESS THE ZONE DESIGN AIRFLOW REQUIRMENT HAS CHANGED. THE BOLD LINES INDICATE MIN AND MAX CFM FOR THE UNIT. IF OPERATING IN THE SHADED AREA AT LOW VOLUMES, VARIATIONS IN FLOW MAY BE GREATER THAN 5%. DATA REPRESENTED IN THIS CHART IS AT STANDARD CONDITIONS OF TEMPERATURE, PRESSURE AND HUMIDITY I.E. SCFM. FAN TURNS OFF BELOW 0.50Vdc.
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SAMPLE

Digital Control Algorithm:

CFM = 0.0149(Vdc)5 - 0.4423(Vdc)4 + 5.0126(Vdc)3- 27.6276(Vdc)2 + 149.7246(Vdc) + 121.2664

Vdc= -2.419E-14(CFM)5 + 7.788E-11(CFM)4 - 1.007E-07(CFM)3 + 6.674E-05(CFM)2 - 9.435E-03(CFM) + 4.870E-01

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Procedure	Steps	Display
Set Mod Fan Action	From the SYSTEM menu choose MOD FAN and then choose one of the following motor types: • STEP (3-speed only) • MODULATE (default – ECM only)	
Set Auto Fan Reset	From the SYSTEM menu choose AUTO FAN RESET for ECM applications only. To adjust default time of 60 mins, select LOCAL OVRD TIME. This function protects from user accidentally changing out Auto Mode on interface. The control will reset back to Auto Mode, while ensuring the efficiency benefits of the variable speed motor.	
Set Stage 1 Fan *(two pipe only)*	From the SYSTEM menu choose Stage 1 fan. Select the fan % for Stage 1.	
Set Stage 2 Fan *(two pipe only)*	From the SYSTEM menu choose Stage 2 fan. Select the fan % for Stage 2.	
Set the valve action	Select one of the valve actions from the SYSTEM menu. • VLV ACTION (two pipe only) • CL VALVE ACTION (four pipe only) • HT VLV ACTION (four pipe only) • MAX VLV LOW • MAX VLV MED • MAX VLV HIGH NOTE ***Not all choices apply to every application.*** Valve action selections: • NORMAL OPEN – The valve changes from fully open to fully closed as the EZstat varies the valve output from 0 to 10 volts • NORMAL CLOSED – The valve changes from fully closed to fully open as the EZstat varies the valve output from 0 to 10 volts. • MAX VLV LOW (two pipe only) – Select % valve, opens for low fan speed • MAX VLV MED (two pipe only) – Select % valve, opens for medium fan speed • MAX VLV HIGH (two pipe only) – Select % valve, opens for high fan speed	 Four Pipe View Four Pipe View Two Pipe View

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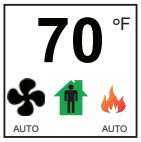
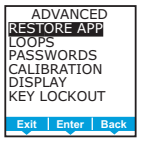
Procedure	Steps	Display
Set DAT ENABLE for modulating valve	Select DAT ENABLE from the system menu to set the ENABLE or DISABLE feature. • ENABLED (default) – This function allows the modulating valve to be controlled by the DAT. • DISABLED – If set to DISABLED, the function will not control the modulated valve.	

6.7 Advanced Options

Use the advanced options to set up the following items.

- Choosing an application and units of measure. Adjusting the PID loops
- Changing passwords Calibrating inputs
- Setting the display blanking
- User lock button and modifying access to users with Password 1.

Setting the advance options requires entering Password 2.

Procedure	Steps	Display
Starting Display	1. Start at the temperature display. 2. Enter Password 2. The display changes to the MAIN menu display.	
Choose the ADVANCED menu	1. To enter the MAIN menu, hold the 1st and 3rd soft keys simultaneously. 2. From the MAIN menu, press either the ▲ or ▼ button to select ADVANCED. 3. Press Enter. The ADVANCED menu opens. 4. Choose any of the following functions: • RESTORE APP • LOOPS • PASSWORDS • CALIBRATION • DISPLAY • KEY LOCKOUT	 
Reset the application and choose units of measure.	Choose RESTORE APP from the ADVANCED menu to do one, or a combination, of following: • Use it also to select/change the EZstat application program from two pipe to four pipe applications. • Reset the EZstat to the original configuration and settings. • Configure the units of measure to display. There are two versions of each application program in every EZstat: o The Metric version displays temperature in Celsius and uses metric values for units of measure. o The English version displays temperature in Fahrenheit and uses English values for units of measure (default).	

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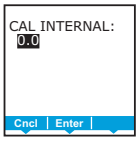
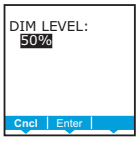
Procedure	Steps	Display
Reset the application and choose units of measure.	NOTE ***Choosing an application will reset the EZstat.***	
Adjust the PID loops.	Choose LOOPS from the ADVANCED menu to adjust the values for the cooling or heating PID loops. Only the proportional and integral properties can be changed from the display. • The proportional default is 2° F. • The integral default is zero (0).	
Enter or change passwords.	Choose PASSWORDS from the ADVANCED menu to set either Password 1 or Password 2. Note: Allow 60 seconds time elapse for password change/setup to enable. • Password 1 is for a facility user and limits changes to active setpoints, fan operation, occupancy, and heating and cooling modes. • Password 2 is for a controls technician to set up and commission the EZstat. When set, will lock user out from setpoints, fan operation, occupancy, and heating and cooling modes. NOTE ***Entering four zeros (0000) removes the password. The EZstat is supplied without passwords.*** 1. From the PASSWORD1 or PASSWORD2 menu either the ▲ or ▼ button to change the first digit of the password. 2. Press the Enter button to select the next digit. Repeat for all four digits. 3. When the Enter button is pressed for the last digit, the new password is saved and the display advances.	
Calibrate the inputs	Choose CALIBRATION from the ADVANCED menu to calibrate an input. The EZstat includes two calibration entries; one for the internal temperature sensor and one for the optional remote temperature sensor connected to the RS terminal. Enter a calibration factor to adjust either input for sensor inaccuracies. • For a low input reading enter a positive correction value. • For a high input reading enter a negative correction value.	 
Set the display blanking.	Choose DISPLAY from the ADVANCED menu to set the display appearance after the last button is pushed. • BLANKING—Choose one of the blanking o CLOCK—An analog clock replaces the temperature and mode icons. o BACKLIGHT OFF—The display brightness changes to the level set by DIM LEVEL after the last button interaction. o NONE—The temperature and mode icons always remain visible. • DIM LEVEL—Sets the level of brightness of the display back light if BACKLIGHT OFF is the selected blanking option.	 

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Procedure	Steps	Display
User lockout buttons	Choose KEY LOCKOUT from the ADVANCED menu to limit accessibility to users with Password 1, the user password. • MODE/SETPOINTS—Users with Password 1 cannot change any value or mode. • MODE—Users with Password 1 cannot change the heating/cooling, fan, or occupancy modes. • NONE—Users with Password 1 have full access to active setpoints, heating/cooling, fan, and occupancy modes.	

7 SEQUENCES OF OPERATION

Topics in this section cover the sequences of operation for the EZstat. These are advanced topics for control's technicians and engineers.

This section covers the following sequences of operation:

- Setpoint Limits
- Occupancy
- Automatic cooling and heating changeover
- Scheduling occupancy
- Display blanking and backlight
- Temperature sensing inputs
- PID control loops
- Valve operation for fan coil units
- Fan operation for fan coil units

7.1 Setpoint Limits

The programming in the EZstat will limit the setpoint entry so that no heating setpoint is set higher than its corresponding cooling setpoint.

If a user is adjusting a setpoint and it falls within the range set by the value of Minimum Setpoint Differential, the corresponding setpoint will be changed to maintain the differential. For example, the Minimum Setpoint Differential is 4° F and the Occupied Heating setpoint is 70° F. If the user lowers the Occupied Cooling setpoint to 71° F, the controller recalculates the Occupied Heating setpoint and changes it to 67° F.

7.2 Occupancy

The EZstat is designed to operate as a stand-alone controller and can determine occupancy based on its internal occupancy schedule. The EZstat can be in any one of the following occupancy states.

- OCCUPIED
- UNOCCUPIED

The occupancy and standby states can also be commanded by another BACnet device or an operator workstation connected to the building automation network.

Occupied

In controllers without a motion sensor, the EZstat starts in the occupied state. If the internal schedule is enabled, the state of the schedule is set to either OCCUPIED or UNOCCUPIED as the initial state.

Unoccupied

The controller changes to the UNOCCUPIED state only if the internal occupancy schedule is enabled and if the schedule is inactive.

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7.3 Automatic cooling and heating changeover

The EZstat can be set to automatically change between the heating and cooling modes.

- If the space temperature rises above the active cooling setpoint, the mode is set to cooling.
- If the space temperature falls below the heating setpoint, the mode is set to heating.

7.4 Scheduling occupancy

The schedule in the controller is a standard BACnet schedule object. It can be changed from the display by a technician with Password 2 or a BACnet operator workstation.

The internal occupancy schedule changes the EZstat between the occupied (ACTIVE) and unoccupied (INACTIVE) states.

7.5 Display blanking and backlight

The EZstat display and backlight can be set to take any of the following actions one minute after the last button is pushed.

- Display an analog clock instead of the temperature display.
- Dim the display to a preset level.
- Remain unchanged.

When the display is dimmed or the clock is visible, the display returns to normal when any button is pushed.

7.6 Temperature sensing inputs

The EZstat includes inputs for sensing space, discharge air, and fan coil unit supply water.

Space temperature sensing

All models of EZstat include an internal temperature sensor for measuring space temperature. For remote temperature sensing, an external, 10,000 ohm, Type II thermistor sensor or Nailor Part# H1-1989 can be connected to terminals RS. If the EZstat detects that a remote sensor is connected, the internal sensor is not used for determining space temperature.

Water temperature sensor

The Water Temperature Sensor input (WST) is a required sensor for two-pipe fan coil units with both heating and cooling applications. The EZstat is configured for a Type III thermistor sensor or Nailor Part# H1-1764B to monitor water temperature.

The water temperature can be monitored as an analog input and is also stored in an analog value object.

Discharge air temperature sensor

The Discharge Air Temperature (DAT) setup is a required for modulating valve applications. The EZstat is configured for a Type III thermistor sensor or Nailor Part# H1-0246 for DAT applications. Discharge air temperature can be monitored as an analog input and is also stored in an analog value object.

The Loop 3 (CL_DAT_Loop) and Loop 4 (HT_DAT_Loop) modulate to the DAT set-points. The valves are controlled off these loops, while the DAT sensor is constantly monitoring the discharge air temperature.

7.7 PID control loops

A PID control loop calculates an error value from the difference between the measured room temperature and the active setpoint. The error value is expressed as a percentage and is typically used in a BAS controller to control the state of an output. When the difference between the setpoint and room temperature is large, the error is large. As the system reduces the difference between the setpoint and space temperature, the error becomes smaller. In a simple example, if the output of the PID loop that is controlling a modulating valve is 50% the valve would be opened half way; if the output of the loop is 100% the valve position is fully open.

The EZstat uses the heating and cooling PID loops which are implemented in all sequences.

The PID loops in the EZstat are standard BACnet objects.

7.8 Valve operation for fan coils

Hot and chilled water valves are used for heating and cooling in the fan coil unit versions of the EZstat. The fan coil two-pipe programming includes also a method to determine supply water temperature.

Modulating valves

On a call for cooling or heating, a modulating valve will modulate from 0 to 100% over the first half (0-50%) of the PID loop output controlling the valve. The EZstat supports both normal and reverse action valves which can be set from the user interface.

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Modulating valves Cont.

- Normal — The valve is fully closed when the output signal is 0 volts and fully open when the output is 10 volts DC.
- Reverse —The valve is fully closed when the output signal is 10 volts and fully open when the output is 0 volts DC.

Two-pipe water supply temperature evaluation

For two-pipe fan coil units, the EZstat uses the WST sensor to determine if chilled or hot water is being supplied to the unit. The water type is determined by comparing the value of the WST input to the room temperature. The EZstat programming then determines that the water temperature is one of the following:

- Chilled—the water temperature is 10° F below room temperature. Hot—the water temperature is 10° F above room temperature.
- None—the water temperature is within 7° F of room temperature.

If the water temperature is evaluated as None, the EZstat runs the water evaluation program every six hours. During a water evaluation, the EZstat opens the valve until a water type is determined or for five minutes, whichever is reached first. If a water evaluation is not being performed, the valve remains closed.

The supply water type is stored in multistate variable Water Available.

Two-pipe with electric heat

For EZstat fan coil models that support both on/off and modulating valves, electric heat can be added to two-pipe systems. Typically this heat is a duct or baseboard resistance heater controlled by a relay.

When the supply water type is chilled water and there is a call for heat, the EZstat controls the heating element through output terminal BO5. The output turns on when the heating loop is equal or greater than 40%. The output is turned off when the loop falls below 40%. If the supply water type is hot water, only the water valve output is used to satisfy a call for heat.

7.9 Fan operation for fan coils

The EZstat supports both modulating fans and fans with one, two, or three speeds. Speed for either type of fan is determined directly off room temperate and the fan is controlled by the PID loops. Fan speed control is set up from the user interface by a user with Password 2.

7.10 One, two, and three speed fans

For one, two, and three speed fans, the EZstat controls the fan speed with terminals FAN-L, FAN-M, and FAN-H. This feature applies to Fan Speed, located in System menu.

The user selects on the interface the Fan selection - Auto, and then in the SYSTEM menu select Fan Speed. See in *Enter the Commissioning Mode*.

- Single speed fans use terminal FAN-L only
- Two speed fans are controlled with terminals FAN-L and FAN-H
- Thee speed fans use terminals FAN-L, FAN-M, and FAN-H

The fan output terminals are energized as the cooling or heating loop varies from 0-100%. Terminal activation is shown in the following table. The values listed below correspond to loop percentages.

Table 7-1 Terminal Activation (Auto Mode)

	Fan L terminal		Fan M terminal		Fan H terminal	
Fan speed	**On**	**Off**	**On**	**Off**	**On**	**Off**
One	*0%	5%	n/a	n/a	n/a	n/a
Two	*0%	5%	n/a	n/a	95%	80%
Three	*0%	5%	65%	50%	95%	80%

NOTE

Fan minimum is enabled at dead band sequence, and loop percentage not applicable.

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Modulating fans

The fan starts a modulation fan on a call for either heating or cooling. The fan runs at the minimum dead band speed until the heating or cooling loop is above 50%, then the fan start to ramping up based on room temperature demand From 50% to 100% of the loop, the fan speed ramps to maximum speed. The minimum and maximum fan speeds are set from the user interface during system setup.

Automatic fan control

A user with Password 1 can set the EZstat controlled fan to either run continuously or to start automatically on a call for cooling or heating.

Auto—when Auto is selected, the fan runs at deadband, and when there is a call for cooling or heating, the fan will begin to modulate toward the maximum cooling or heating fan airflow. Fan will continue to run unless system mode is changed to Off mode on the user interface.

Low, Medium, High—for systems with three-speed fans, the user has the choice of low, medium or high speed as the continuous running speed for the fan.

NOTE

If the user selects one of these speeds on the user interface, this will override the auto functionality and Nailor sequences. However, if the user accidentally overrides AUTO function, the AUTO FAN RESET (for ECM applications only) can prevent this from occurring, by Enabling the AUTO FAN RESET located in SYSTEM menu. The AUTO FAN RESET feature works together with LOCAL OVRD Time. To adjust default time of 60 mins, select LOCAL OVRD TIME. The control will reset back to Auto Mode, while ensuring the efficiency benefits of EON (variable speed) motor.

8 SYSTEM INTEGRATION

Topics in this section cover integrating EZstat controllers into a building automation network. These are advanced topics for control technicians and engineers.

The EZstat can function as a standalone controller or it can be connected to a BACnet MS/TP network. The topics in this section are reference material for control technicians or engineers that will be installing and setting up an EZstat that is connected to a network.

In addition to the information in this section, you will also need the following information.

- Detailed plans and drawings for the building automation system.
- Information about the facility LAN including routers, switches, and network firewalls.
- Application Note AN0404A, *Planning BACnet Networks*.

8.1 BACnet objects

The EZstat is a BACnet Application Specific Controller (ASC) that is composed of standard BACnet objects. This section lists the objects that are likely to be needed for monitoring with a standard BACnet operator workstation to verify system operation.

NOTE

Changing the configuration of any object may result in unpredictable operation of the EZstat and damage to equipment that is under control of the EZstat.

Not all input objects are present in every model.

Input objects

The following BACnet input objects represent values at the physical inputs of the EZstat. Only inputs 1-3 are available for external connections.

Table 8-1 EZstat Input objects

Input	Name	Description	Device Type Screen Display
AI1	REMOTE_SENSOR	Remote Room Sensor	KMC10K_Type_II
AI2	WATER_TEMP	Water Temperature	KMC10K_Type_III
AI3	DAT	Discharge Air Temp	KMC10K_Type_III
AI4	LOCAL_SENSOR	Space Temp	KMC10K_Type_II

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Output objects

The following BACnet output objects represent values at the physical outputs of the EZstat.

Table 8–2 Fan coil unit, two-pipe

Input	Name	Description	Device Type
AO6	ANALOG VALVE	Analog Valve Output	0-100% (0-10V)
AO7	ANALOG AUX HEAT	Auxiliary Heat	0-100% (0-10V)
AO8	ANALOG FAN	Fan Speed Control	0-100% (0-10V)
BO1	LOW	Fan Low Speed	Unknown
BO2	MEDIUM	Fan Medium Speed	Unknown
BO3	HIGH	Fan High Speed	Unknown
BO4	STAGE_2_HEAT	Stage 2 Heat	Unknown
BO5	STAGE_1_HEAT	Stage 1 Heat	Unknown

Table 8–3 Fan coil units, four-pipe

Input	Name	Description	Device Type
A06	ANALOG_COOLING	Analog Cooling Output	0-100% (0-10 V)
A07	ANALOG_HEATING	Analog Heating Output	0-100% (0-10 V)
A08	ANALOG_FAN	Fan Speed Control	0-100% (0-10 V)
B01	LOW	Fan Low Speed	Unknown
B02	MEDIUM	Fan Medium Speed	Unknown
B03	HIGH	Fan High Speed	Unknown
B04	BINARY_COOLING	Cooling Valve	Unknown
B05	BINARY_HEATING	Heating Valve	Unknown

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Value objects

BACnet value objects represent setpoints or other operational data in the EZstat.

Setpoints—the analog value objects in the following table represent operational setpoints for the EZstat applications. All of the setpoints are available from the user interface.

Table 8–4 Analog value objects—Setpoints

Value object	Name	Description
AV3	ACT_COOL_STPT	Active Cooling Setpoint
AV4	ACT_HEAT_STPT	Active Heating Setpoint
AV5	OCC_CL_STPT	Occupied Cooling Setpoint
AV6	OCC_HT_STPT	Occupied Heating Setpoint
AV7	UNOCC_CL_STPT	Unoccupied Cooling Setpoint
AV8	UNOCC_HT_STPT	Unoccupied Heating Setpoint
AV9	MAX_CL_STPT	Minimum Cooling Setpoint
AV10	MAX_HT_STPT	Maximum Heating Setpoint
AV11	MIN_STPT_DIFF	Minimum Setpoint Differential
AV12	STBY_OFFSET	Standby Offset
AV25	FAN_OFF_DELAY	Fan Off Delay
AV31	Max_VLV_LOW	Maximum Valve at Low Fan Speed
AV32	Max_VLV_MED	Maximum Valve at Medium Fan Speed
AV33	Max_VLV_HIGH	Maximum Valve at High Fan Speed
AV34	FAN_SPEED	Fan Speed
AV35	FAN_COOL_MAX	Fan Cool Maximum Speed
AV36	FAN_MINIMUM	Fan Minimum Speed
AV37	FAN_HEAT_MAX	Fan Heat Maximum Speed
AV38	OVRD_TIME	Local Override Timer

Temperature points—the following analog value objects represent temperatures points derived from the EZstat input sensors.

Table 8–5 Analog value objects—Temperature points

Value object	Name	Description
AV1	SPACE_TEMP	Space Temperature
AV19	WATER_TEMP	Water Temperature
AV20	DISCHARGE_TEMP	Discharge Air Temperature

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Operating states and modes—the binary and multistate value objects represent operating conditions in the EZstat. Objects BV5 and BV36 are related to the schedule.

Table 8–6 Binary value objects

Value object	Name	Description
BV5	OCC_SCHEDULE	Occupy Schedule
BV6	DAT_ENABLE	DAT Enable
BV7	DAT_SENSOR	DAT Sensor Present
BV9	FAN_NEED	Call for Fan
BV10	COOL_HEAT_NEED	Cooling or Heating needed
BV11	SPEED_UP	Speed up Timers x15
BV13	OCCUPIED_FAN	Fan On During Occupied Mode
BV14	FAN_STATUS	Fan Proof
BV15	MOD_FAN_ACTION	Modulating or Stepped Fan Action
BV16	AUTO_FAN_RESET	Reset Fan Back to Auto
BV18	CL_VLV_ACTION	Normal Close/Normal Open
BV19	HT_VLV_ACTION	Normal Close/Normal Open
BV20	COOL_STG_1	Cooling Stage 1
BV22	HEAT_STG_1	Heating Stage 1
BV28	LOCAL_OVRD	Local Override Mode
BV36	STPT_HOLD	Hold Temperature Setpoint

Table 8–7 Multi-state value objects

Value object	Name	Description
MSV1	OCCUPIED_MODE	Occupied Mode
MSV2	SYSTEM_MODE	Control Mode
MSV3	FAN_MODE	Fan Auto-Manual Mode
MSV4	AVAILABLE_SPEEDS	Number of Fan Speeds Available

Schedule object

The EZstat occupancy state is controlled from a standard BACnet schedule object. The occupancy state is stored in the reference object binary value object OCC_SCHEDULE. The exception schedule within the schedule object is represented in the user interface as the holiday schedules.

Table 8-8 Schedule object

Object	Name	Description	Object Reference
1	SCHED_1	Schedule #1	BV5

Loop objects

The BACnet PID loops are used for valve and fan modulation, staging, economizer operation, and reheat during dehumidification. The proportional and integral properties of the cooling and heating loops are available from the user interface.

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Table 8-9 PID control loops

Value object	Name	Description
LOOP1	CL LOOP	Cooling Loop
LOOP2	HT LOOP	Heating Loop
LOOP3	CL_DAT LOOP	Cooling Loop
LOOP4	HT_DAT LOOP	Heating Loop

NOTE

The difference between the PID Loop types.

- **CL LOOP/HT LOOP - directly controls the fan and modulates off of room temperature**
- **CL_DAT LOOP/HT_DAT LOOP - modulate to the DAT setpoints. The valves are controlled off these loops.**

8.2 Connecting to MS/TP network

Before connecting the EZstat to a BACnet MS/TP network, configure the network properties. See the topic Set up communications in for the procedure to set the following:

- Device instance
- MAC address
- Baud

Use the following principles when wiring the EZstat to an MS/TP network:

- Connect no more than 128 addressable BACnet devices to one MS/TP network. The devices can be any mix of EZstat controllers, other BACnet controllers, or BACnet routers.
- To prevent network traffic bottlenecks, limit the MS/TP network size to 60 controllers.
- Use 18 gauge, twisted pair, and shielded cable with capacitance of no more than 51 picofarads per foot for all network wiring. Belden cable model #82760 meets the cable requirements.
- Connect the -A terminal in parallel with all other - terminals. Connect the +B terminal in parallel with all other + terminals. Connect the shield to an earth ground at one end only.
- Use a KMD-5575 repeater between every 32 MS/TP devices or if the cable length will exceed 4000 feet (1220 meters). Use no more than seven repeaters per MS/TP network.
- Place a KMD-5567 surge suppressor in the cable where it exits a building.

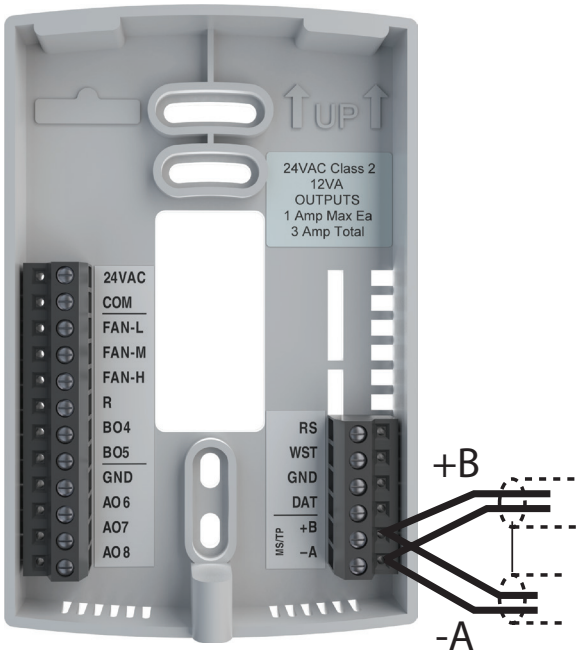

Illustration 8–1 BACnet MS/TP network wiring

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The controllers or devices on the physical ends of the MS/TP wiring segment must have end-of-line (EOL) termination installed for proper network operation. Set the end-of-line termination to On using the EOL switches.

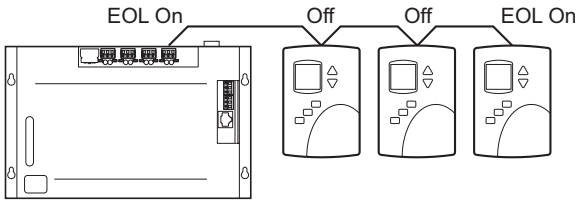

Illustration 8-2 Location for end-of-line termination

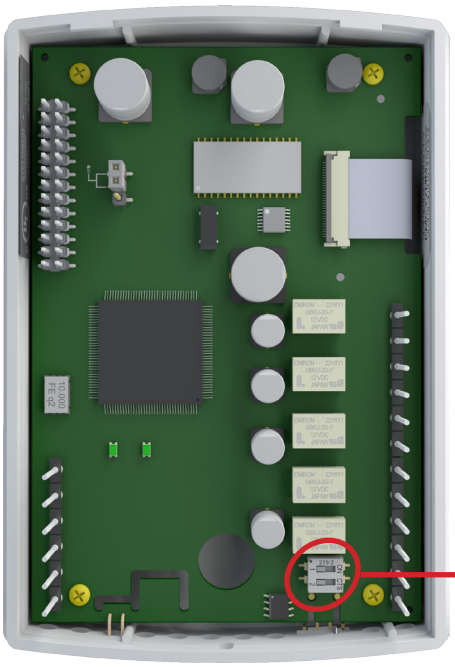

Illustration 8-3 Location of EOL switch

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